

CAROLINE M. TUCKER

PERSONAL

carolinemtucker@gmail.com

carolinemtucker.com

1911-914 Yonge St.,
Toronto, ONT Canada
T: 1.604.754.3120

EDUCATION

PhD. 2013.

Department of Ecology and Evolutionary Biology. University of Toronto, Canada
Supervisor: Dr. Marc Cadotte

B.Sc. 2008.

Honours Biology, Mount Saint Vincent University; Canada

PROFESSIONAL EXPERIENCE

Aquatic Research Biologist 2B, Ontario Ministry of Natural Resources and Forestry, Aquatic Research and Monitoring Section (Fixed term contract, Dec. 2020 – Apr. 2021, Jan. 2023 - July 2023).

- Duties include development of Bayesian model incorporating multiple indices to improve estimates of recreational fishing pressure on Ontario inland lakes.

Professional Research Biologist, Ontario Power Generation (Fixed term contract, Mar-Jun. 2022, Dec. 2022).

- Analysis of impingement data and evaluation of measures of gains and losses in fish biomass.

Professional Research Biologist, Canada Wildlife Services (Fixed term contract, Nov 2021-May 2022).

- Statistical analyses of CWS-Ontario grassland bird, sparrow, and shorebird data.

Aquatic Research Biologist OS, Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, Lake Ontario Monitoring Unit (Fixed term contract, Sept. 2021 – Mar. 2022).

• Developed custom Bayesian model of Salmon and Trout recreational fishery effort, catch, and harvest in the Western Basin of Lake Ontario

- Provide recommendations for optimization of future creel protocols.

Professional Research Biologist, Ontario Power Generation and University of Toronto, Scarborough (Fixed term contract, May-Aug. 2021).

- Analysis of fish survey data and development of a Bayesian model to describe fish growth and population dynamics in order to estimate productivity of habitat bank offset in relation to FAA regulatory requirements.
- Presented results as a report and presentation to stakeholders and DFO.

Aquatic Research Biologist, Ecology and Evolutionary Biology, University of Toronto (Dr. Donald Jackson) and Ontario Ministry of Natural Resources and Forestry (Fixed term contract, Sept 2020 – Dec. 2020).

- Duties included data organization, statistical data analysis and development of a framework for modelling changes in fish productivity with habitat change in Ontario lakes.
- Gained in-depth understanding of 'Mizer' fisheries modelling platform its relation to production and habitat characteristics.
- Experience using HEAT assessment tool to model habitat changes and their impact on suitability for fish species.

Associate Consultant, Apex Resource Management Solutions. (Aug 2020 – Dec. 2020).

- Environmental consulting, protected area planning, and ecological forecasting using quantitative, GIS, and statistical skills.

Adjunct Professor to Curriculum for the Environment, Ecology, and Energy (E3P)
University of North Carolina at Chapel Hill (Aug 2020 - 2022).

Assistant Professor. Department of Biology,
University of North Carolina at Chapel Hill (July 2017 – August 2020).

- Ran research lab working on experimental microcosms and quantitative community ecology; mentored students and postdoctoral fellows; taught undergraduate and graduate classes in Ecology and Ecological Modelling.

Postdoctoral Research Fellow. EU Marie Skłodowska-Curie International Incoming Fellow.
Centre d'Ecologie Fonctionnelle et Evolutive-CNRS, France. (2016-2017).

NSERC Postdoctoral Research Fellow, University of Colorado, Boulder (2014-2016)

SKILLS

- More than 10 years of experience and training with quantitative analyses in population and community ecology, fisheries and natural resources, conservation and management.
- Broad experience working with fisheries modelling and associated issues
 - Particularly Great Lake and inland lake fisheries and issues in Ontario, Canada
 - E.g. population (catch at age), recreational creel survey, size spectrum, fish production models.
 - DFO Fisheries Act Authorization compliance and application experience
- Outstanding statistical skills and experience building custom coded statistical and mathematical analyses.
 - Experienced R, GIS, Stan, and git user
 - Experienced user of both Bayesian and frequentist modelling approaches
 - Coauthor of 3 R packages (pez, funrar, and ecolottery).
 - ArcGIS and qGIS experience
- Experience interacting with stakeholders (angler, First Nations, government, and industry groups).
- Invited speaker, multiple universities and conferences.
- Author of 30+ peer reviewed papers, with ~1800 citations. Copies can be found at <http://carolinemtucker.com/publications/>
- Successful mentor and collaborator with diverse individuals at multiple career stages.

R libraries

- Grenié, M., Denelle, P., Tucker, C.M. Funrar: functional rarity indices computation. 2016. (<https://cran.r-project.org/web/packages/funrar/index.html>)
- François Munoz, Adrien Taudière, Fabien Laroche, Matthias Grenié, Pierre Denelle, Caroline M. Tucker and Cyrille Violle.. ecolottery: Coalescent-Based Simulation of Ecological Communities. (<https://cran.r-project.org/web/packages/ecolottery/index.html>)
- Pearce, W.D, Cadotte, M.W., Cavender-Bares, J., Ives, A.R., Tucker, C.M., Walker, S.C., Helmus, M.R. 2015. pez: Phylogenetics for the Environmental Sciences. (<https://cran.r-project.org/web/packages/pez/index.html>)

WORKSHOPS

sCAP: Conservation and Phylogenies working group, *co-organized* with Arne Mooers (2017-2018)

- German Centre for Integrative Biodiversity Research (iDiv)
- Canadian Institute for Ecology and Evolution (CIEE)

Cutting EDGE: science for conservation, *Participant*, Zoological Society of London (2017)

sPHY: Synthesizing phylogenetic measures for ecology and conservation, *Participant*, iDiv (2013-2015)

BIBLIOGRAPHY

- Gumbs, R., Gray, C. L., Böhm, M., Burfield, I. J., Couchman, O. R., Faith, D. P., ... & Rosindell, J. (2023). The EDGE2 protocol: Advancing the prioritisation of Evolutionarily Distinct and Globally Endangered species for practical conservation action. *PLoS Biology*, 21(2), e3001991.
- LWK Ng, C Chisholm, LR Carrasco, ES Darling, F Guilhaumon, AO Mooers, CM Tucker, M Winter, D Huang. 2022. Prioritizing phylogenetic diversity to protect functional diversity of reef corals. *Diversity and Distributions* 28 (8), 1721-1734.
- Mooers, A. and Tucker, C. 2021. Macroevolution: useful plants have deep evolutionary roots. *New and Views, Nature Ecology and Evolution*.
- Frances, D. Barber, A. and *Caroline M. Tucker*. 2021. Trait-density relationships explain performance in cladoceran zooplankton. *Ecology*. e03294.
- Nicolas Loiseau, Nicolas Mouquet, Nicolas Casajus, Matthias Grenié, Maya Guéguen, Brian Maitner, David Mouillot, Annette Ostling, Julien Renaud, *Caroline Tucker*, Laure Velez, Wilfried Thuiller, Cyrille Violle. 2020. Global distribution and conservation status of ecologically rare mammal and bird species. *Nature Communications*. 11: 5071.
- *Caroline M Tucker*, Tracy Aze, Marc W Cadotte, Juan L Cantalapiedra, Chelsea Chisholm, Sandra Díaz, Richard Grenyer, Danwei Huang, Florent Mazel, William D Pearse, Matthew W Pennell, Marten Winter, Arne O Mooers. 2019. Assessing the utility of conserving evolutionary history. *Biological Reviews*. 94(5): 1740-1760.
- K. Bodie Weedop, Arne O. Mooers, *Caroline M. Tucker*, William D. Pearse. The Effect of Phylogenetic Uncertainty and Imputation on EDGE Scores. 2019. *Animal Conservation*. Early View. **Featured article**.
- K Bodie Weedop, AØ Mooers, *CM Tucker*, William D Pearse. Preserving evolutionary history with improved confidence. 2019. *Animal Conservation*. 22(6):541
- Matthias Grenié, David Mouillot, Sébastien Villéger, Pierre Denelle, Valeriano Parravicini, *Caroline M. Tucker*, François Munoz, Cyrille Violle. 2018. Worldwide functional rarity of coral reef fishes: a new currency for conservation strategies. *Biological Conservation*. 226, 288-299.
- Florent Mazel, Matthew W. Pennell, Marc Cadotte, Sandra Diaz, Giulio Valentino Dalla Riva, Richard Grenyer, Fabien Leprieur, Arne O. Mooers, David Mouillot, *Caroline M. Tucker*, and William Pearse. 2019. Reply to: "Global conservation of phylogenetic diversity captures more than just functional diversity". *Nature Communications*: 10(1): 858.
- Florent Mazel, Matthew W. Pennell, Marc Cadotte, Sandra Diaz, Giulio Valentino Dalla Riva, Richard Grenyer, Fabien Leprieur, Arne O. Mooers, David Mouillot, *Caroline M. Tucker*, and William Pearse. 2018. Prioritizing phylogenetic diversity captures functional diversity unreliably. *Nature Communications*: 9(1): 2888.
- Cadotte, M.W. and *Tucker, C.M.* 2018. Difficult decisions: addressing non-congruence in taxonomic, phylogenetic and functional measures for site priority. *Biological Conservation*. 225:128-133.
- *Caroline M. Tucker*, T. Jonathan Davies, Marc W. Cadotte, and William D. Pearse. 2018. On the relationship between phylogenetic diversity and trait diversity. *Ecology*. 99(6), 1473-1479.
- François Munoz, Adrien Taudière, Fabien Laroche, Matthias Grenié, Pierre Denelle, *Caroline M. Tucker* and Cyrille Violle. 2018. ecolottery: Coalescent-based simulation of ecological communities. *Methods in Ecology and Evolution*. 9(3), 693-703.
- Matthias Grenié, Pierre Denelle, *C.M. Tucker*, François Munoz, and Cyrille Violle 2017. funrar: an R package to characterize functional rarity. *Diversity and Distributions*. 226, 288-299.
- Cadotte, M.W., *Tucker, C.M.* 2017. Should environmental filtering be abandoned? *Trends in Ecology and Evolution*, 32(6), 429-437.
- Marc W Cadotte, *Caroline M Tucker*. Embracing the nonindependence of the environmental filter: A reply to responses. 2017. *Trends in ecology & evolution*. 32(12):886-887.
- Freschet, G. T., O. J. Valverde-Barrantes, *C. M. Tucker*, J. M. Craine, L. M. McCormack, C. Violle, F. Fort, C. B. Blackwood, K. R. Urban-Mead, and C. M. Iversen. 2017. Climate, soil and plant functional types as drivers of global fine-root trait variation. *Journal of Ecology*. 105 (5), 1182-1196.
- *Tucker, C.M.*, Marc W. Cadotte, Silvia B. Carvalho, Jonathan Davies, Simon Ferrier, Susanne A. Fritz, Rich Grenyer, Matthew R. Helmus, Lanna S. Jin, Arne O. Mooers, Sandrine Pavoine, Oliver Purschke, David W. Redding, Dan. F. Rosauer, Marten Winter, Florent Mazel. 2017. A guide to phylogenetic metrics for conservation, community ecology and macroecology. *Biological Reviews*. 92 (2), 698-715.
- *Tucker, C.M.*, Shoemaker, L., Nemergut, D., Davies, K., Melbourne, B.A. 2015. Differentiating between niche and neutral assembly in metacommunities using null models of beta-diversity. *Oikos*. 125 (6), 778-789.

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- Tucker, C.M. and Fukami, T. 2014. Environmental variability counteracts priority effects to facilitate species coexistence: evidence from nectar microbes. *Proc. R. Soc. B*. 281:1778.
- Jeganmohan, S., Tucker, C.M., and Cadotte, MW. 2014. Colonization rates in a metacommunity altered by competition. *PLoS ONE*. 9:2, e88344.
- Tucker, C.M., Cadotte, M.W. 2013. Unifying measures of biodiversity: understanding when richness and phylogenetic diversity should be congruent. *Diversity and Distributions*. 19:7, 845-854.
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- Abrams, P., Tucker, C.M., Gilbert, B. 2012. Evolution of the storage effect. *Evolution*. 67(2), 315-327.
- Tucker, C.M., Rebelo, A.G., Davies, J.D., Cadotte, M.W. 2012. The distribution of biodiversity: linking richness to geographical and evolutionary rarity in a biodiversity hotspot. *Conservation Biology*. 25:2, 593-601.
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- Tucker, C.M., Avila-Sakar, G. 2010 Ontogenetic changes in tolerance to herbivory among three ecotypes of *Arabidopsis thaliana*. *Oecologia*. 164:4, p1005-1015.